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EFFECT OF PROMISING INSECT REPELLENTS ON PLASTICS AND PAINTS[1]

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One of the investigations at the Orlando, Fla., laboratory since 1942 has been the search for insect repellents. After preliminary screening, the promising materials are exhaustively examined for their effectiveness and suitability for application to the skin and clothing.

The ideal insect repellent should not attack or affect plastics. Consequently promising chemicals are tested for their action on currently used plastics as well as painted and varnished surfaces. In 1946 the effect of 380 of the better repellents on several types of plastics was determined. All these materials had been effective as skin applications against mosquitoes for more than 180 minutes and were considered to be the most promising insect repellents. Four types of plastic were used in the tests: Lucite (a methacrylate resin), cellulose acetate, Vinylite (a vinyl chloride-acetate polymer), and Ameroid (a casein plastic).[2] The plastic sheeting was cut into 1-inch squares, and one drop of chemical was placed in the center. After 48 hours it was wiped clean and the effect of the repellent observed. This is a more rigorous test than required by the Army-Navy specification AN-C-154, 28 December 1945, in which the chemical is kept on the plastic for only 6 hours before examination for chemical attack. The slightest effect, such as a dulling or softening of the surface of the plastic, was considered to show an attack on the plastic.

Only three of the chemicals--the isopropyl ester of mandelic acid (O-1788), lactic acid (O-3130), and the formate of lactic acid (O-3141)--affected Ameroid. The action on Lucite, cellulose acetate, and Vinylite is shown in table 1.

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[1] This work was conducted under funds allotted by the Department of the Army to the Entomology Research Branch.

[2] Mention of proprietary products does not constitute their endorsement by the Department of Agriculture.

Sixty-eight compounds produced no visible change in any of the plastic materials. The Lucite was attacked to some extent by 261 compounds, cellulose acetate by 126, and Vinylite by 251, but only 99 affected all three.

Of the repellents in common use, 2-ethyl-1,3-hexanediol (O-375) and 2-cyclohexylcyclohexanol (O-1023) affected none of the plastics, whereas dimethyl phthalate (O-262) attacked all except Ameroid and 2-phenylcyclohexanol (O-2133) attacked Lucite and Vinylite. Dimethyl carbate (O-3916) and dimethyl phthalate (O-262), which are used with 2-ethyl-1,3-hexanediol (O-375) in the military specification for M-2020 (MIL-R-249A (QMC), 31 July 1952) attacked all these plastics except the Ameroid.

N-Butylacetanilide (O-2484), used with benzyl benzoate and 2-butyl-2-ethyl-1,3-propanediol in the military specification for a general-purpose clothing treatment (MIL-R-12123 (QMC), 21 July 1952), attacked all these plastics except the Ameroid. Benzyl benzoate and 2-butyl-2-ethyl-1,3-propanediol were not tested.

In the course of additional investigations between 1946 and 1953, many of the compounds that did not affect plastics proved unsatisfactory for other reasons, and many new compounds appeared promising. In 1953 more extensive tests[3] were conducted with 136 chemicals that were of interest at that time to determine their action on various types of surfaces that might be contacted by the repellents in normal use, including paint, varnish, synthetic fabrics, and various plastics. Tests of painted surfaces were run on plywood panels painted with a primer coat and three coats of enamel or with three coats of spar varnish. Nylon and rayon (viscose) were used as representative synthetic fabrics, and Plexiglas, Vinylite, Plastocele, and polyethylene as sheet plastics.

A test rack made to hold five trays 18 by 18 inches was used to facilitate the testing of a number of the chemicals at one time. Each tray was marked off into squares 1 1/2 inches on each side. Spaces were used at the top for designating the plastic and on the left side for the chemical code number. The painted and varnished wood, cloths, and sheet plastics were cut into 1-inch squares and placed on the trays. Two drops of repellent were applied to each type of surface, and observations made after 24 hours and again after 7 days. The degree of injury was recorded as (1) no damage, (2) slight damage, (3) moderate damage, or (4) severe damage, complete spoilage of surface.

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[3] John Pituch assisted in making the tests.

Only two of the chemicals, 2-benzyloxynaphthalene (O-945) and 2-isopentyloxynaphthalene (O-950), affected polyethylene and only to a slight degree. Nylon was affected only by staining by 14 materials. All the compounds had a moderate to severe effect on varnish. The action on paint, Plexiglas, Vinylite, rayon, and Plastocele is shown in table 2.

Only two compounds had no effect on paint, one of which, octyl crotonate (O-6057), affected only varnish and Vinylite, and the other, 3,6,8-trimethyl-4-nonyne-3,6-diol (O-13138), affected only varnish. Three compounds, including 2-ethyl-1,3-hexanediol (O-375), had no initial effect on paint and showed only slight damage after 7 days, and 20 showed only slight damage after 24 hours. Vinylite was damaged by 107 repellents, Plexiglas by 58, rayon by 55, and Plastocele by 46.

Thirty-seven compounds were tested in 1946 and 1953. An acrylic resin was used in each series--Lucite in the first and Plexiglas in the second--and a vinyl resin, Vinylite, in both series. There was apparently sufficient difference between the two acrylate resins to account for the lack of agreement in testing of 15 of the compounds. The same results were obtained in testing on Vinylite with all other compounds except two--N-isobutyl-4-cyclohexene-1,2-dicarboximide (O-7396) and the monobenzoate of 1,3-propanediol (O-6378)--which were found to attack this plastic in the second test, whereas this action was not observed in 1946.

Table 1. --Action of 380 repellent materials on different surfaces after 48 hours of contact. N = not affected, A = damaged.

Orlando: No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
614	Acetamide, alpha-butoxy-N-cyclohexyl-	A	N	A
925	Acetamide, alpha-butoxy-N-pentyl-	N	N	A
1881	Acetamide, N-cyclohexyl-alpha-(2-methylallyloxy)-	N	N	A
6605	Acetamide, alpha-cyclohexyloxy-N,N-diethyl-	A	N	A
2184	Acetamide, N,N-dibutyl-	N	A	A
1015	Acetamide, N,N-dipentyl-	N	N	A
5508	Acetamide, N,N-diisopentyl-	N	N	A
2484	Acetanilide, N-butyl-	A	A	A
5523	Acetanilide, N-ethyl-	N	A	A
5528	Acetanilide, N-isopentyl-	A	N	A
5797	Acetanilide, N-pentyl-	A	N	A
5524	Acetanilide, N-propyl-	N	A	A
4343	Acetic acid, chloro-, 2-nitroisobutyl ester	A	A	A
7178	Acetic acid, chloro-, tetrahydrofurfuryl ester	A	A	A
7187	Acetic acid, cyano-, cyclohexyl ester	A	A	A
7370	Acetic acid, cyano-, 3-methylcyclohexyl ester	A	N	A
7371	Acetic acid, cyano-, 4-methylcyclohexyl ester	A	N	A
2674	Acetic acid, phenyl-, 2-chloroallyl ester	A	A	A
5083	Acetic acid, (o-phenylenedioxy)-, methyl ester	A	A	A
11089	Acetoacetic acid, ethyl ester, oxime acetate	A	N	N
10031	2-Acetonaphthone, 5,6,7,8-tetrahydro-	N	N	A
1029	Acetophenone, p-ethoxy-	A	A	A
227	Acetophenone, p-methoxy-	A	A	A

Table 1.--Continued.

Orlando: No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
10516	Acetophenone, 4-methoxy-3-methyl-	A	N	A
5003	Acetylsalicylic acid, ethyl ester	A	N	A
6511	Adipamic acid, *N*,*N*-diethyl-, ethyl ester	A	A	A
6484	Adipamic acid, *N*,*N*-diisopropyl-, methyl ester	N	N	A
6099	Anisic acid, isopropyl ester	A	N	A
1170	Anisyl alcohol	A	A	A
2377	Anthranilic acid, ethyl ester	A	A	A
2577	Anthranilic acid, isopropyl ester	A	N	A
1022	Anthranilic acid, methyl ester	A	A	A
2576	Anthranilic acid, propyl ester	A	A	A
5914	Anthranilic acid, *N*-butyryl-*N*-methyl-, methyl ester	N	A	A
5712	Benzaldehyde, *p*-butoxy-	A	N	A
5868	Benzaldehyde, *o*-hexyloxy-	A	N	A
5714	Benzaldehyde, *p*-isopropoxy-	A	N	A
10515	Benzaldehyde, *p*-methoxymethyl-	A	A	A
5685	Benzaldehyde, *p*-(2-methylallyloxy)-	A	A	A
5518	Benzaldehyde, *p*-propoxy-	A	A	A
6142	Benzaldehyde, 2, 4, 6-trimethyl-	A	N	A
1197	Benzamide, *N*,*N*-diethyl-	A	A	A
8090	1, 3-Benzodioxan-4-one, 2-methyl-	A	A	A
6414	1, 3-Benzodioxole-2-acetic acid, 2-methyl-, ethyl ester	A	A	A
5085	Benzoic acid, *o*-acetyl-, methyl ester	A	A	A
5007	Benzoic acid, *o*-ethoxy-, methyl ester	A	N	A
5883	Benzyl alcohol, *p*-*sec*-butoxy-	A	N	N
7783	Benzyl alcohol, *o*-chloro-*alpha*-(trichloromethyl)-	A	A	A
5517	Benzyl alcohol, *p*-ethoxy-	A	A	A
338	Benzyl alcohol, *alpha*-ethoxymethyl-	A	A	A
11215	Benzyl alcohol, *alpha*-isobutyl-	A	N	N
5844	Benzyl alcohol, *p*-isopentyloxy-	A	N	N
5521	Benzyl alcohol, *o*-methoxy-	A	A	A
10017	Benzyl alcohol, alpha-propenyl-	A	N	A

Table 1. --Continued.

Orlando: No. O-	Repellent	Lucite	Cellulose: acetate	Vinylite
3078	Chromone, 2-ethyl-	A	A	A
2313	Cinnamic acid, allyl ester	A	N	A
667	Cinnamic acid, ethyl ester	A	A	A
2024	Cinnamic acid, propyl ester	A	N	A
5527	Cinnamic acid, p-methoxy-, ethyl ester	A	N	A
5823	Citronellal, 7-hydroxy-	N	N	N
5824	Citronellal, 7-hydroxy-, dimethyl acetal	N	N	N
5000	Citronellic acid	N	N	N
12130	Crotonanilide, N-methyl-	A	A	A
10002	Crotonic acid, beta-diethylamino-, methyl ester	N	A	A
6604	Cyclohexaneacetamide, 1-hydroxy-N,N-diisopropyl-	N	N	N
4999	Cyclohexaneacetic acid, alpha-cyano-, ethyl ester	A	N	A
6226	Cyclohexaneacetic acid, 1-hydroxy-, butyl ester	N	N	A
6600	Cyclohexaneacetic acid, 1-hydroxy-, cyclopentyl ester	N	N	A
6201	Cyclohexaneacetic acid, 1-hydroxy-, ethyl ester	N	N	A
6599	Cyclohexaneacetic acid, 1-hydroxy-, isopentyl ester	N	N	A
6225	Cyclohexaneacetic acid, 1-hydroxy-, propyl ester	A	N	A
3957	Cyclohexanecarbonitrile, 1-hydroxy-x-methyl-	A	A	A
6608	Cyclohexanecarboxylic acid, 1-hydroxy-, acetonyl ester	A	N	N
6498	Cyclohexanecarboxylic acid, 1-hydroxy-, 2-butoxyethyl ester	A	N	N
6134	Cyclohexanecarboxylic acid, 1-hydroxy-, cyclohexyl ester	N	N	A

Table 1. --Continued

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
5519	Benzyl alcohol, p-propoxy-	A	A	N
6503	Benzyl alcohol, alpha-propoxymethyl-	A	N	A
2269	Benzyl ether	A	N	A
5932	Bicyclo[2.2.1]-5-heptene-2-carboxylic acid, 2-furfuryl ester	A	N	A
1000	Bicyclo[2.2.1]-5-heptene-2,3-dicarboximide, N-pentyl-	N	N	A
4132	Bicyclo[2.2.1]-5-heptene-2,3-dicarboxylic acid, diethyl ester	A	N	A
3916	Bicyclo[2.2.1]-5-heptene-2,3-dicarboxylic acid, cis-, dimethyl ester. (Dimethyl carbate)	A	A	A
12199	1-Butanol, 1-(2-hydroxycyclohexyl)-	N	N	N
10037	3-Buten-2-ol, 4-phenyl-	A	N	N
5926	Butyraldehyde, alpha-(2-cyanoethyl)-alpha-ethyl	N	N	A
5814	Butyranilide, N-methyl-	A	A	A
6312	Butyric acid, ester with N-ethyl-N-(2-hydroxyethyl)butyramide	A	A	A
5853	Butyric acid, 2-ethyl-3-hydroxyhexyl ester	N	N	N
6257	Butyric acid, 3-hydroxycyclohexyl ester	A	N	A
7943	Butyric acid, 2-oxocyclohexyl ester	A	N	A
6152	Butyric acid, 3-phenylpropyl ester	A	N	A
5854	Butyric acid, 1,2,3,4-tetrahydro-2-naphthyl ester	A	N	A
4629	Butyric acid, alpha-ethyl-	N	A	A
6221	Butyric acid, beta-hydroxy-beta-phenyl-, ethyl ester	A	N	A
6224	Butyric acid, beta-hydroxy-beta-phenyl-, isopropyl ester	A	N	A
2062	Butyrophenone	A	A	A
4840	Carbamic acid, (2-butoxyethoxy)-acetyl-, butyl ester	A	N	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
6133	Cyclohexanecarboxylic acid, 1-hydroxy-, cyclopentyl ester	A	N	A
6494	Cyclohexanecarboxylic acid, 1-hydroxy-, 2-ethoxyethyl ester	A	N	A
6136	Cyclohexanecarboxylic acid, 1-hydroxy-, isopentyl ester	N	N	A
13182	1,2-Cyclohexanedicarboximide, *N*-allyl-4-methyl-	A	N	A
7409	1,2-Cyclohexanedicarboximide, *N*-butyl-	A	N	A
13105	1,2-Cyclohexanedicarboximide, *N*-*sec*-butyl-	N	N	A
13201	1,2-Cyclohexanedicarboximide, *N*-butyl-3-methyl-	N	N	A
13108	1,2-Cyclohexanedicarboximide, *N*-isobutyl-	A	N	A
13186	1,2-Cyclohexanedicarboximide, *N*-isobutyl-4-methyl-	N	N	A
13189	1,2-Cyclohexanedicarboximide, *N*-isopropyl-4-methyl-	N	N	A
5567	1,2-Cyclohexanedicarboxylic acid, diethyl ester	A	N	A
12000	1,2-Cyclohexanedicarboxylic acid, *cis*-, diethyl ester	A	N	A
12001	1,2-Cyclohexanedicarboxylic acid, *trans*-, diethyl ester	A	N	A
5560	1,2-Cyclohexanedicarboxylic acid, dimethyl ester	A	A	A
6236	1,3-Cyclohexanediol, diacetate	A	N	A
5846	Cyclohexanol, 2-(1-cyclohexenyl)-	N	N	N
1023	Cyclohexanol, 2-cyclohexyl-	N	N	N
7085	Cyclohexanol, 1-(3-hydroxypropenyl)-	N	N	N
5516	Cyclohexanol, 4-methoxy-	N	A	N
5917	Cyclohexanol, 2-pentyloxy-	N	N	N
2133	Cyclohexanol, 2-phenyl-	A	N	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
5507	Cyclohexanol, 2-*m*-tolyl-, *trans*-	A	N	N
5511	Cyclohexanol, 2-(2, 5-xylyl)-, *trans*	N	N	N
7289	Cyclohexanone, 4-methyl-, oxime	N	N	N
7058	1-Cyclohexene-1-acetic acid, 2-hydroxy-, lactone, mixture with $\Delta^{1,\mathit{alpha}}$-cyclohexaneacetic acid, 2-hydroxy-, lactone	A	A	A
5023	2-Cyclohexene-$\Delta^{1,\mathit{alpha}}$-acetic acid, *alpha*, 3, 5, 5-tetramethyl-, methyl ester	A	N	A
7323	3-Cyclohexene-1-carboxaldehyde, 2, 6-dimethyl-	A	A	A
7164	3-Cyclohexene-1-carboxaldehyde, 5, 6-dimethyl-, oxime	A	N	N
6535	2-Cyclohexene-1-carboxylic acid, 2, 6-dimethyl-4-oxo-, ethyl ester	A	A	A
6534	2-Cyclohexene-1-carboxylic acid, 6-ethyl-2-methyl-4-oxo-, ethyl ester	A	N	A
7209	4-Cyclohexene-1, 2-dicarboximide, *N*-allyl-	A	A	A
7447	4-Cyclohexene-1, 2-dicarboximide, *N*-allyl-3-methyl-	A	A	A
7386	4-Cyclohexene-1, 2-dicarboximide, *N*-allyl-4-methyl-	A	A	A
4145	4-Cyclohexene-1, 2-dicarboximide, *N*-butyl-	A	A	A
7369	4-Cyclohexene-1, 2-dicarboximide, *N*-*sec*-butyl-	N	N	A
7396	4-Cyclohexene-l, 2-dicarboximide, *N*-isobutyl-	N	N	N
7392	4-Cyclohexene-1, 2-dicarboximide, *N*-propyl-	A	A	A
5647	2-Cyclohexen-1-ol, 1-phenyl-	A	N	N
6596	Cyclopentaneacetic acid, 1-hydroxy-, cyclohexyl ester	N	N	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
4923	$\Delta^{1,\,\textit{alpha}}$-Cyclopentaneacetic acid, *alpha*-cyano-, methyl ester	A	N	A
6500	Cyclopentanecarboxylic acid, 1-hydroxy-, 2-butoxyethyl ester	A	N	N
6138	Cyclopentanecarboxylic acid, 1-hydroxy-, cyclohexyl ester	N	N	A
6139	Cyclopentanecarboxylic acid, 1-hydroxy-, cyclopentyl ester	A	N	A
6496	Cyclopentanecarboxylic acid, 1-hydroxy-, tetrahydrofurfuryl ester, acetate	A	N	A
6472	Cyclopentanecarboxylic acid, 2-oxo-, cyclopentyl ester	A	N	A
4991	1-Cyclopentene-1-malonic acid, diethyl ester	A	N	A
9221	Cyclopentenol, cyclopentenyl-	N	N	N
5555	1,1-Cyclopropanedicarboxylic acid, dibutyl ester	A	N	A
5545	1,3-Cyclopropenedicarboxylic acid, 2-methyl-, diethyl ester	A	A	A
12144	2,4-Decanediol	N	N	N
4453	Decanoic acid	N	N	N
262	Dimethyl phthalate. (Phthalic acid, dimethyl ester)	A	A	A
7082	*m*-Dioxane, 5-ethyl-5-nitro-2-(1-propenyl)-	A	A	A
7090	*m*-Dioxane, 5-ethyl-5-nitro-2-propyl-	A	N	A
7228	*m*-Dioxane, 2-isopropyl-5-methyl-5-nitro-	N	N	N
5533	*m*-Dioxane, 4-(p-methoxyphenyl)-5-methyl-	A	N	A
5723	*m*-Dioxane, 2-(p-methoxyphenyl)-4,4,6-trimethyl-	A	N	A
7081	*m*-Dioxane, 5-methyl-5-nitro-2-(1-propenyl)-	A	N	A
7102	*m*-Dioxane, 5-methyl-5-nitro-2-propyl-	A	A	A

Table 1. --Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
5079	5-m-Dioxanol, 2-(1-ethylpentyl)-	A	N	N
5103	5-m-Dioxanol, 2-(1-ethylpropyl)- and 1,3-Dioxolane-4-methanol, 2-(1-ethylpropyl)-	A	N	N
5078	5-m-Dioxanol, 2-pentyl-	A	N	N
7425	1,4-Dioxaspiro[4.5]decane-2-methanol	A	N	N
9006	1,5-Dioxaspiro[5.5]undecan-3-ol, 8-methyl-	A	N	N
5027	1,3-Dioxolane, 2-hexyl-4-(methoxymethyl)-	N	N	N
6440	1,3-Dioxolane-2-acetic acid, 2-methyl-, cyclohexyl ester	A	N	A
7430	1,3-Dioxolane-4-methanol, 2-methyl-2-phenyl-	A	A	N
6502	1,3-Dioxolane-2-propionic acid, 4-methoxymethyl-2-methyl-, ethyl ester	A	N	A
6238	1,3-Dioxolan-4-one, 2,2-dimethyl-5-phenyl-	A	A	A
2528	Ethane, 1-(2-chloroethoxy)-2-(p-chlorophenoxy)-	A	A	A
1040	Ethanol, 2-(benzyloxy)-	A	A	A
170	Ethanol, 2-(2-butoxyethoxy)-, acetate	A	A	A
2812	Ethanol, 2-(p-sec-butylphenoxy)-	A	N	N
2225	Ethanol, 2-(p-chlorophenoxy)-	A	A	A
373	Ethanol, 2-(2-cyclohexyloxyethoxy)-	A	A	A
300	Ethanol, 2-[2-(2-ethylhexyloxy)ethoxy]-	N	N	N
301	Ethanol, 2-(2-hexyloxyethoxy)-	N	N	N
164	Ethanol, 2-(alpha-methylbenzyloxy)-	A	A	A
165	Ethanol, 2-(alpha-methylbenzyloxy)-, acetate	A	A	A
773	Ethanol, 2-(3-methyl-2-norcamphanylmethoxy)-	A	N	N
774	Ethanol, 2-[2-(3-methyl-2-norcamphanylmethoxy)ethoxy]-	N	N	N
752	Ethanol, 2-phenoxy-	A	A	A

Table 1.--Continued.

Orlando: No. O- :	Repellent	: :Lucite:	:Cellulose: acetate	:Vinylite
339	Ethanol, 2-(tetrahydro-2,6-dimethyl-3-pyranylmethoxy)-	N	N	N
5542	Ethanol, 2,2'-thiodi-, diacetate	A	A	A
4337	Ether, terpinyl triethylene glycol	N	N	N
12079	Formanilide, N-butyl-	A	A	A
12080	Formanilide, N-ethyl-	A	A	A
5539	2-Furanacrylic acid, sec-butyl ester	A	A	A
5863	2-Furanacrylic acid, 2-ethoxyethyl ester	A	N	A
5540	2-Furanacrylic acid, 2-methoxyethyl ester	A	A	A
5866	2-Furanacrylic acid, 2-methylallyl ester	A	N	A
5536	2-Furanacrylic acid, pentyl ester	A	N	A
5674	Furfuryl alcohol, alpha-(p-chlorobenzyl)-	A	N	A
6109	2-Furoic acid, furfuryl ester	A	A	A
12136	Geranic acid	N	N	N
6369	Glutaramic acid, N,N-diethyl-, methyl ester	A	A	A
6358	Glutaramic acid, N,N-diisopropyl-, ethyl ester	N	N	A
6375	Glutaramic acid, N,N-diisopropyl-, methyl ester	A	N	A
6397	Glutaramic acid, N,N-diisopropyl-, propyl ester	N	N	A
6365	Glutaramic acid, N,N-dipropyl-, ethyl ester	A	N	A
6373	Glutaramic acid, N,N-dipropyl-, methyl ester	A	A	A
6525	Glycine, N-benzyl-, butyl ester	A	N	A
4339	Glycine, N-butyl-, isobornyl ester	N	N	A
12142	2,4-Heptanediol, 5-ethyl-	N	N	N
5963	2,4-Heptanediol, 6-methyl-	A	N	N
5850	3,5-Heptanediol, 2,4-dimethyl-	N	N	N
5982	3,5-Heptanediol, 2,4,4-trimethyl	N	N	N

Table 1.--Continued.

Orlando: No. O- :	Repellent	: :Lucite:	:Cellulose: acetate	:Vinylite
2073	Heptanoic acid	A	N	N
6387	Heptanoic acid, 5-hydroxypentyl ester	N	N	N
13179	4-Heptyne-3,6-diol, 3-isopropyl-2,6-dimethyl-	A	N	N
5876	Hexanal, 2-(2-cyanoethyl)-2-ethyl-	A	N	A
375	1,3-Hexanediol, 2-ethyl-	N	N	N
12192	1,3-Hexanediol, 2-isopropyl-5-methyl-	N	N	N
6316	1,6-Hexanediol, diacetate	A	A	A
7555	2,4-Hexanediol, 3,4-dimethyl-	N	N	N
5911	2,4-Hexanediol, 3-ethyl-	N	N	N
12014	2,4-Hexanediol, 3-methyl-	N	N	N
5838	2,4-Hexanediol, 5-methyl-	N	N	N
12022	2,4-Hexanediol, 3,3,5-trimethyl-	N	N	N
6103	Hexanoic acid, 2-hydroxyethyl ester	N	A	N
6333	Hexanoic acid, 2-hydroxypropyl ester	A	N	N
6094	Hexanoic acid, 3-hydroxypropyl ester	A	N	N
7949	Hexanoic acid, 2-oxocyclohexyl ester	A	N	A
6169	Hexanoic acid, tetrahydrofurfuryl ester	A	N	A
1371	Hexanoic acid, 2-ethyl-	A	N	N
6210	Hexanoin	N	N	A
4990	5-Hexen-2-one, 6-phenyl-	A	A	A
6216	Hydracrylic acid, beta-phenyl-, ethyl ester	A	A	A
6217	Hydracrylic acid, beta-phenyl-, isopropyl ester	A	N	A
6220	Hydracrylic acid, beta-phenyl-, methyl ester	A	A	A
6218	Hydracrylic acid, beta-phenyl-, propyl ester	A	A	A
13013	Hydratropaldehyde, oxime	A	A	N
7219	Hydrocinnamic acid, alpha,beta-epoxy-alpha,beta-dimethyl-, methyl ester	A	A	A
7227	Hydrocinnamic acid, alpha,beta-epoxy-alpha,beta-dimethyl-, propyl ester	A	N	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
7415	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*alpha*-ethyl-, allyl ester	A	N	N
7169	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*beta*-ethyl-, methyl ester	A	N	A
7374	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*alpha*-methyl-, allyl ester	A	N	A
7355	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*alpha*-methyl-, methyl ester	A	N	A
7121	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*beta*-methyl-, allyl ester	A	N	A
7383	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*beta*-methyl-, 2-methylallyl ester	A	N	A
7401	Hydrocinnamic acid, *alpha*, *beta*-epoxy-*beta*-methyl-, propyl ester	A	N	A
11190	Hydrocinnamic acid, *beta*-hydroxy-*alpha*-methyl-, ethyl ester	A	N	N
5960	2-Indanol, 1-methoxy-	A	A	N
2638	Isobutyranilide, *N*-ethyl-	A	A	A
6155	Isovaleric acid, diester with 1,5-pentanediol	N	N	A
11009	Ketone, cyclohexyl phenyl	N	N	N
3130	Lactic acid	N	A	N
3166	Lactic acid, 2-(2-butoxyethoxy)ethyl ester	A	A	N
3141	Lactic acid, formate	N	A	N
6551	Lactic acid, 3-hydroxy-2-methyl-, cyclohexyl ester, 2-acetate	A	N	A
6499	Lactic acid, 3-hydroxy-2-methyl-, isopentyl ester, 2-acetate	N	N	A
1654	Lactic acid, 2-methyl-, benzyl ester	A	A	A
1650	Lactic acid, 2-methyl-, phenethyl ester	A	A	A
4298	Lactic acid, 2-methyl-, phenylpropyl ester	A	N	A

Table 1.--Continued.

Orlando: No. O- :	Repellent	: :Lucite:	:Cellulose: acetate	:Vinylite
6514	Levulinamide, *N,N*-diisopropyl-	N	N	A
6461	Levulinamide, *N,N*-dipropyl-	A	A	A
3924	Levulinic acid, cyclohexyl ester	A	N	A
6335	Maleamic (or fumaramic) acid, *N,N*-diethyl-, ethyl ester	A	A	A
6336	Maleamic (or fumaramic) acid, *N,N*-pentamethylene-, ethyl ester	A	A	A
337	Malic acid, *dl*, dibutyl ester	A	N	N
1789	Mandelic acid, butyl ester	A	A	A
1643	Mandelic acid, ethyl ester	A	A	A
4202	Mandelic acid, hexyl ester	A	N	A
4203	Mandelic acid, isobutyl ester	A	A	A
1788	Mandelic acid, isopropyl ester	A	A	A
6545	4-Morpholineacetic acid, butyl ester	A	A	A
4262	4-Morpholineacetic acid, isobornyl ester	N	N	A
7160	1-Naphthaleneëthanol, 5,6,7,8-tetrahydro-	N	N	N
7018	1(2*H*)-Naphthalenone, 3,4-dihydro-5,8-dimethyl-	N	N	A
7039	1-Naphthol, 1,2,3,4-tetrahydro-	A	N	N
11183	2-Naphthol, decahydro-	A	A	N
11281	2-Naphthol, 2-ethynyldecahydro-, *cis*-	A	N	N
5563	2-Naphthol, 1,2,3,4-tetrahydro-	A	A	A
5997	2-Naphthol, 1,2,3,4-tetrahydro-1-methoxy-	A	A	N
5847	2-Naphthol, 1,2,3,4-tetrahydro-1-methyl-	A	N	N
11314	*beta*-Nicotyrine	A	A	A
6207	Nitrilotricarboxylic acid, triethyl ester	A	N	A
6337	1,9-Nonanediol, diacetate	A	N	A
5949	2,4-Nonanediol	N	N	N
5947	3,5-Nonanediol, 4-methyl-	N	N	N
10539	5-Nonanone, oxime	N	N	N

Table 1. -- Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
13138	4-Nonyne-3,6-diol, 3,6,8-trimethyl-	N	N	N
13058	1,2-Octanediol	N	N	N
13039	2,3-Octanediol	N	N	N
5946	2,4-Octanediol	N	N	N
5916	2,4-Octanediol, 3-ethyl-	N	N	N
5955	2,4-Octanediol, 7-methyl-	N	N	N
12026	3,5-Octanediol, 4-ethyl-	N	N	N
12013	3,5-Octanediol, 2,4,4-trimethyl-	N	N	N
12181	4,6-Octanediol, 2-methyl-	N	N	N
5877	Octanoic acid, 4-ethyl-4-formyl-	A	N	A
6145	Octanoic acid, 2-hydroxy-, butyl ester	N	N	N
6135	Octanoic anhydride	N	N	A
7147	3-Octene-2,5-diol, 2,5,7-trimethyl-	N	N	N
7139	3-Octyne-2,5-diol, 2,5,7-trimethyl-	N	N	N
7179	1-Oxaspiro[2.5]octane-2-carboxylic acid, 2-methyl-, allyl ester	A	N	A
6263	1,5-Pentanediol, diacetate	A	A	A
11231	1-Pentanol, 5-phenyl-	A	N	N
2518	Phenethyl alcohol, *p*-bromo-	A	A	A
2719	Phenethyl alcohol, *p*-chloro-	A	A	A
5672	Phenethyl alcohol, *p*-chloro-*alpha*-isopropyl-	A	N	A
5852	Phenethyl alcohol, *p*, *alpha*-diisopropyl-	A	N	N
5857	Phenethyl alcohol, *p*-ethoxy-	A	A	N
2718	Phenethyl alcohol, *ar*-ethyl-	A	A	N
5889	Phenethyl alcohol, *p*-isopropoxy-	A	N	N
1774	Phenethyl alcohol, *p*-isopropyl-	A	N	N
5522	Phenethyl alcohol, *p*-methoxy-	A	A	N
5939	Phenethyl alcohol, *m*-methyl-	A	A	A
7014	Phenethyl alcohol, *o*-methyl-	A	A	N
5525	Phenethyl alcohol, *p*-propyl-	A	N	N
11189	Phenol, 2,3-dimethoxy-	A	A	A
3451	Phenol, phenethyl-	A	N	N
3346	Phenol, 2,4,6-tris(dimethylaminomethyl)-	N	N	A
3348	Phenol, tris(ethylaminomethyl)-	N	N	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
2250	Phthalic acid, ethyl methyl ester	A	N	A
2419	Phthalimide, *N*-*sec*-butyl-	A	N	A
13208	2,3-Pinanediol	N	N	N
558	Pinene, ether with ethylene glycol	N	N	N
7695	Piperidine, 1-(diethylsulfamyl)-	A	N	A
6544	1-Piperidineacetic acid, cyclohexyl ester	N	N	A
7816	4-Piperidone, 1-(dibutylsulfamyl)-	N	N	A
6383	Pivalic acid, diester with 1,5-pentanediol	N	N	A
7243	Pivalophenone, *beta*-hydroxy-	A	N	N
1442	Propanediol, x-(2-ethylbutoxy)-	N	N	N
4562	1,2-Propanediol, 3-(1,3-dimethylbutoxy)-	N N	N N	N N
4561	1,2-Propanediol, 3-(2-ethylhexyloxy)-	N	N	N
4201	1,2-Propanediol, 3-(hexyloxy)-	N	N	N
3554	1,2-Propanediol, 3-isopentyloxy-	N	N	N
6378	1,3-Propanediol, monobenzoate	A	A	N
3358	1,3-Propanediol, 2-amino-2-ethyl-	N	N	N
4265	1-Propanol, 2-amino-3-isobornyloxy-2-methyl-	N	N	N
5562	1-Propanol, 3-(*p*-methoxyphenyl)-	A	A	N
374	2-Propanol, 3-(2-cyclohexyloxy-1-methylethoxy)-	A	N	N
3555	2-Propanol, 1,3-diisopentyloxy-	N	N	N
168	2-Propanol, 1-(*alpha*-methylbenzyloxy)-	A	N	N
1123	2-Propanol, 1-[2-(3,3,5-trimethylcyclohexyloxy)propoxy]-	N	N	N
5794	Propionanilide, *N*-butyl-	N	N	A
5802	Propionanilide, *N*-pentyl-	N	N	A
12030	Propionanilide, *N*-propyl-	A	N	A
6154	Propionic acid, diester with 1,5-pentanediol	A	A	A

Table 1.--Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
6310	Propionic acid, ester with *N*-butyl-*N*-(2-hydroxyethyl)propionamide	A	A	A
6319	Propionic acid, 1,6-hexanediol diester	A	N	A
6254	Propionic acid, 3-hydroxycyclohexyl ester	A	A	A
6602	Propionic acid, 4-hydroxycyclohexyl ester	N	N	N
6317	Propionic acid, 5-hydroxypentyl ester	A	A	A
6113	Propionic acid, *p*-methoxybenzyl ester	A	A	A
6526	Propionic acid, 2-phenyl-2-hydroxyethyl ester	A	A	N
1910	Propionic acid, 2-benzyloxy-2-methyl-, benzyl ester	A	N	A
7434	Propionic acid, *beta*-chloro-, tetrafurfuryl ester	A	A	A
2075	Propyl sulfone	A	A	A
11559	Pyridine, 2-benzyl-	A	A	A
6581	1-Pyrroleacetic acid, cyclopentyl ester	A	N	A
12089	Quinaldine, 1,2,3,4-tetrahydro-1-propionyl-	N	N	A
5002	Salicylic acid, methyl ester, propionate	A	N	A
6215	Spiro[cyclohexane-1,4'-1,3-dioxolane]-2'-acetic acid, 2'-methyl-5'-oxo-, ethyl ester	A	N	A
10003	Stearamide	N	N	N
6388	Succinamic acid, *N*,*N*-diethyl-, *sec*-butyl ester	A	N	A
6166	Succinamic acid, *N*,*N*-diethyl-, ethyl ester	A	A	A
6172	Succinamic acid, *N*,*N*-diethyl-, isopropyl ester	A	A	A
6168	Succinamic acid, *N*,*N*-diethyl-, propyl ester	A	A	A
6402	Succinamic acid, *N*,*N*-diisobutyl-, methyl ester	A	N	A

Table 1. --Continued.

Orlando No. O-	Repellent	Lucite	Cellulose acetate	Vinylite
6390	Succinamic acid, *N*,*N*-diisopropyl-, *sec*-butyl ester	A	N	A
6350	Succinamic acid, *N*,*N*-diisopropyl-, isopropyl ester	A	N	A
6348	Succinamic acid, *N*,*N*-diisopropyl-, propyl ester	A	N	A
6393	Succinamic acid, *N*,*N*-dipropyl-, *sec*-butyl ester	A	N	A
6252	Succinamic acid, *N*,*N*-dipropyl-, ethyl ester	A	A	A
6251	Succinamic acid, *N*,*N*-dipropyl-, propyl ester	A	N	A
5611	Succinic acid, *alpha*-cyano-*beta*-methyl-, diethyl ester	A	N	A
4133	Succinimide, *N*-octyl-	A	N	A
2971	Succinimide, *N*-pentyl-	A	A	A
3572	Tartaric acid, diisopropyl ester	A	A	N
5835	2,4,8,10-Tetroxaspiro[5.5]undecane, 3,9-diethyl-	A	N	N
5784	Tiglic acid, benzyl ester	A	N	A
5783	Tiglic acid, phenethyl ester	A	N	A
2252	Tropic acid, *dl*-, methyl ester	A	A	N
2280	Undecanoic acid	N	N	N
751	Undecanoic acid, hydroxy-, lactone	A	N	A
7146	10-Undecenamide, *N*,*N*-diethyl-	N	N	A
2065	Undecenoic acid	N	N	N
7784	9-Undecenoic acid, 2,2,2-trichloro-*tert*-butyl ester	N	N	N
6601	Valeramide, 3-hydroxy-3-methyl-*N*,*N*-dipropyl-	N	N	A
11159	Valeric acid, 4-methyl-2-oxo-, ethyl ester, oxime	A	N	N
10517	Valerophenone, *p*-methoxy-	A	N	A

Table 2. --Action of 136 repellents on different surfaces after 24 hours of contact. Effect after 7 days of contact shown in parentheses, if different from that after 24 hours.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
7706	Acetamide, *alpha*-benzoxy-*N*-dodecyl-	4	1	1	4	1
614	Acetamide, *alpha*-butoxy-*N*-cyclohexyl-*	4	1	4	2	1
16751	Acetamide, *N*-cyclohexyl-*N*-tetrahydro-furfuryl-	4	1	4	3	1
15235	Acetamide, *N*-octyl-	3(4)	1	1	1	1
5797	Acetanilide, *N*-pentyl-	4	1	4	1	1(2)
5524	Acetanilide, *N*-propyl-	4	2	4	4	4
11710	Acetonitrile, methyl-phenylamino-**	4	2(4)	4	1	1(3)
479	Acetophenone, 3, 4-dichloro-	3	1	4	1	1
6107	Anisic acid, isobutyl ester	4	1	4	2	1
1170	Anisyl alcohol*	4	4	3	4	4
5868	Benzaldehyde, *o*-hexyloxy-*	4	1	4	1	1
8906	Benzaldehyde, *m*-nitro-	4	3(4)	4	1	1
20299	Benzamide, *o*-bromo-*N*, *N*-diethyl-	4	1	4	1	1
17586	Benzamide, *o*-chloro-*N*, *N*-diethyl-	4	1	4	3	1(3)
20216	Benzamide, *N*, *N*-diethyl-*o*-methoxy-	4	1	4	3	1(4)
20297	Benzamide, *o*-ethoxy-*N*, *N*-diethyl-	4	1	4	4	1(3)
19083	Benzamide, *o*-ethoxy-*N*, *N*-dipropyl-	4	1	4	1	1
5756	Benzyl alcohol, *o*-butoxy-	4	1(4)	4	1	1
5883	Benzyl alcohol, *p*-*sec*-butoxy-*	4	1(4)	1	2	1
6503	Benzyl alcohol, *alpha*-propoxymethyl-*	4	4	4	1	1

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
2269	Benzyl ether	3	1(4)	4	1	1
8439	Bicyclo[2. 2. 1]-5-heptene-2, 3-dicarboxylic acid, methylpropyl ester**	3	4	4	1	1(2)
8438	Bicyclo[2. 2. 1]-5-heptene-2, 3-dicarboxylic acid, dipropyl ester	4	1	4	1	1
16533	2, 3-Butanediol, 1-phenyl-, monoformate	4	2(4)	1(2)	4	3(4)
7558	1, 3-Butanediol, 1-(dimethylcyclohexyl)-	2(3)	1	1	3	1
5903	Butanol, 4-*p*-methoxyphenyl-	4	1(4)	1(3)	1	1
20034	3-Buten-1-ol, 1-(*o*-methoxyphenyl)-	4	4	3	1	1
12036	Butyranilide, *N*-propyl-	4	1	4	1	1
10577	Butyric acid, benzoylmethyl ester**	4	4	4	1	4
7087	Butyric acid, diester with 2-ethyl-2-nitro-1, 3-propanediol	2(3)	1	4	1	1
5854	Butyric acid, 1, 2, 3, 4-tetrahydro-2-naphthyl ester*	4	1	4	1	1
1456	Butyric acid, *alpha*-ethyl-, diester with triethylene glycol	3	1	4	2	1
2024	Cinnamic acid, propyl ester*	4	1	4	1	1
20023	Cinnamic acid, 1, 2, 3, 4-tetrahydro-2, 2, 6-trimethyl-**	3	4	4	1	4
6057	Crotonic acid, octyl ester	1	1	3	1	1
6191	Crotonic acid, phenethyl ester	3	2	4	3	1
7226	Cyclohexaneactic acid, *alpha*-cyano-, 2-ethoxyethyl ester	4	1(3)	4	4	2

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
4922	$\Delta^{1,\textit{alpha}}$-Cyclohexaneacetic acid, *alpha*-cyano-, methyl ester	3	1(3)	4	2	1
6226	Cyclohexaneacetic acid, 1-hydroxy-, butyl ester* **	4	1	4	1	1
6494	Cyclohexanecarboxylic acid, 1-hydroxy-, 2-ethoxyethyl ester*	4	1(4)	4	1	1
20188	Cyclohexanecarboxylic acid, 1-hydroxy-, 2-propoxyethyl ester	4	2(1)	4	1	1
12218	Cyclohexanecarboxylic acid, 2-hydroxy-, isopentyl ester	4	1	4	1	1
7085	Cyclohexanol, 1-(3-hydroxypropenyl)-*	2(3)	1	1	1	1
5950	Cyclohexanol, 2-phenethoxy-	3	1	2	1	1
2133	Cyclohexanol, 2-phenyl-*	4	1	4	1	1
5023	2-Cyclohexene-$\Delta^{1,\textit{alpha}}$-acetic acid, *alpha*, 3, 5, 5-tetramethyl-, methyl ester*	4	1	4	1	1
6534	2-Cyclohexene-1-carboxylic acid, 6-ethyl-2-methyl-4-oxo-, ethyl ester*	4	1	4	3	1
20221	3-Cyclohexene-1-carboxylic acid, 6-methyl-	3(4)	1(3)	1(2)	1	1
7396	4-Cyclohexene-1, 2-dicarboximide, *N*-isobutyl-*	3	1	4	3	1(2)
6560	2-Cyclohexene-1, 5-dicarboxylic acid, 2, 6-dimethyl-4-oxo-, ethyl ester	2(3)	1	4	4	1

Table 2.--Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
7837	2-Cyclohexene-1,5-dicarboxylic acid, 2,6-dimethyl-4-oxo-, diethyl ester	2(3)	1	4	3	1
7165	3-Cyclohexene-1,1-dimethanol, 5,6-dimethyl-	2(3)	1	1	2	1
4923	$\Delta^{1,\text{alpha}}$-Cyclopentaneacetic acid, *alpha*-cyano-, methyl ester*	3	2	4	1	1
6500	Cyclopentanecarboxylic acid, 1-hydroxy-, 2-butoxyethyl ester*	4	1	1	1	1
18013	4*a*-Dibenzofuranmethanol, 1,4,4*a*,5*a*,6,9,9*a*,9*b*-octahydro-**	4	1	4	1	1
5103	5-*m*-Dioxanol, 2-(1-ethylpropyl)- and 1,3-Dioxolane-4-methanol, 2-(1-ethylpropyl)-	4	1	1	1	1(4)
5024	5-*m*-Dioxanol, 2-hexyl-	3	1	1	1	1
8296	Ethanol, 2-(2-allylphenoxy)-	4	4	2	1	1
373	Ethanol, 2-(2-cyclohexyloxyethoxy)-*	4	1	4	1	1
2220	Ethanol, 2-(diethylphenoxy)-	4	1	1(3)	4	1
9524	Ethanol, dodecyloxy-	2	1	1	1	1
4783	Ethanol, 2-[2-(isobornyloxyethoxy)-ethoxy]-	3	1	1	1	1
2633	Ethanol, 2-(2-phenylcyclohexyloxy)-	4	1(3)	3	1	1
2219	Ethanol, 2-toloxy-	4	4	3	4	4
4723	Ethylene glycol, alkyl benzyl ethers	4	1	1(3)	1	1
14249	Fencholic acid	1(2)	1	1	1	1

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
11634	2-Furanpropionic acid, beta-oxo-, ethyl ester**	4	4	4	1	4
6395	Glutaramic acid, N,N-diethyl-, propyl ester	4	2(4)	4	4	4
6375	Glutaramic acid, N,N-diisopropyl-, methyl ester*	2(4)	1	2(3)	2	1
6397	Glutaramic acid, N,N-diisopropyl-, propyl ester*	3	1(4)	4	4	1
6537	Glycine, N-methyl-N-phenyl-, ethyl ester**	4	4	4	1	1
14254	Glycolamide, N-pentyl-, benzoate	4	1	4	1	1
3219	Glycolic acid, sec-butyl ester, butyl carbonate	2	1	4	1	1
5963	2,4-Heptanediol, 6-methyl-*	2	1	1	1	1
375	1,3-Hexanediol, 2-ethyl-*	1(2)	1	1	1	1
6380	1,6-Hexanediol, diformate	4	4	4	4	4
6219	Hydracrylic acid, beta-phenyl-, butyl ester	4	4	4	1	1
6220	Hydracrylic acid, beta-phenyl-, methyl ester*	4	4	1(3)	4	4
7227	Hydrocinnamic acid, alpha,beta-epoxy-alpha,beta-dimethyl-, propyl ester* **	4	1	4	2	1
7153	Hydrocinnamic acid, alpha,beta-epoxy-beta-methyl-, methyl ester**	3	1(2)	1	1	4

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
2638	Isobutyranilide, *N*-ethyl-*	4	1	4	1	1(3)
11009	Ketone, cyclohexyl phenyl*	2(4)	1	1	1	1
15675	Lactamide, *N*, *N*-dibutyl-, acetate	4	1	4	2	1
14484	Lactic acid, butoxyethoxy ethyl ester	4	1	1	1	1(2)
17401	Lactic acid, 2-hexyloxy ethyl ester	3	1	1	1	1
595	Lactic acid, phenethyl ester	4	4	3	4	4
3167	Lactic acid, 2-phenoxyethyl ester	4	4	1	4	4
8757	Lactic acid, tetrahydrofurfuryl ester, ethyl carbonate	4	2(3)	4	4	4
2531	Maleic acid, diallyl ester	3	4	4	4	4
6592	Malic acid, *dl*-, di-*sec*-butyl ester	4	1	4	1	1
11067	Malonic acid, (3-butenyl)methyl-, diethyl ester	2	1	4	2	1
20241	Mandelic acid, allyl ester	4	4	4	4	4
20127	Mandelic acid, pentyl ester	4	4	4	1	1
20351	Mandelic acid, isopentyl ester	4	1(4)	4	1	1
4203	Mandelic acid, isobutyl ester*	3	1	4	1	1
20224	Mandelic acid, propyl ester	4	4	4	4	4
20145	Mandelonitrile, (3, 4-methylenedioxy)-**	4	4	4	4	4
19165	Morpholine, chrysanthemummono-carbonyl-	1(2)	1	2	2	1
18284	Morpholine, 4-pelargonyl-	4	1	4	2	1(4)
945	Naphthalene, 2-benzyloxy-	3	1(3)	4	1	1

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
950	Naphthalene, 2-isopentyloxy-	2	1	4	2	1
13138	4-Nonyne-3, 6-diol, 3, 6, 8-trimethyl-* **	1	1	1	1	1
13058	1, 2-Octanediol*	2	1	1	1	1
13039	2, 3-Octanediol*	4	1	1	1	1
12181	4, 6-Octanediol, 2-methyl-*	2	1	1	1	1
8118	Octanoic acid, tetrahydrofurfuryl ester	4	1	4	1	1
13211	Octanoic acid, 4-ethyl-3-hydroxy-, allyl ester	2(4)	1	1	1	1
7406	2, 4-Pentanedione, 3-benzylidine-**	3	1	4	1	1
17109	Phenol, 2-allyl-4-methoxy-**	4	4	4	1	4
143	Phenol, 2-chloro-4-phenyl-	4	2(4)	2	1	1
9047	Phenol, o-cyclohexyl-	4	1(4)	4	3	2(1)
262	Phthalic acid, dimethyl ester	3	1(4)	4	3	1(4)
558	Pinene, ether with ethylene glycol*	2	1	1	4	1
20293	Piperonyl alcohol, alpha-tert-butyl-**	4	1	1	1	1(2)
13111	Propane, 1, 2-epoxy-3-(p-chloro-phenoxy)-	4	4	4	1	1(3)
6378	1, 3-Propanediol, monobenzoate*	4	3	3	4	4
3555	2-Propanol, 1, 3-diisopentyloxy-*	2	1	1	1	1
5700	Propionic acid, diester with 2, 2'-thio-diethanol	4	4	4	1	1(3)
6254	Propionic acid, 3-hydroxycyclohexyl ester*	4	1	1(3)	1	1(3)
8771	Propionic acid, 3-(2-ethoxyethyl)-, 2-ethoxyethyl ester	4	4	4	3	4

Table 2. --Continued.

Orlando: No. O-	Repellent	Paint	Plexiglas	Vinylite	Rayon	Plastocele
3253	Propionic acid, 3-furfuryloxy-, methyl ester**	4	4	3	1	4
5974	Quinoline, 1-butyryl-1, 2, 3, 4-tetrahydro-	4	1	4	4	1(2)
16335	Solvesso No. 150 (aromatic petroleum fraction)	2	1	1	1	1
6021	Suberic acid, ethyl ester	4	1(3)	4	2	1
6166	Succinamic acid, N, N-diethyl-, ethyl ester *	4	1(4)	4	4	4
6405	Succinamic acid, N, N-diisopropyl-, ethyl ester	4	1	4	1	1
6396	Succinamic acid, N, N-diisopropyl-, methyl ester	4	1(4)	4	4	1(4)
6619	Succinamic acid, N, N-dipropyl-, allyl ester	4	1	4	2	1
6252	Succinamic acid, N, N-dipropyl-, ethyl ester*	4	1	4	1	1
7039	alpha-Tetralol	4	4	2(3)	1	2(3)
20218	m-Toluamide, N, N-diethyl-	4	1	4	4	4
22542	m- Toluamide, N, N-diethyl- (Crude)	4	1	4	1(3)	4
20217	o-Toluamide, N, N-diethyl-	4	1	4	4	4
20219	p-Toluamide, N, N-diethyl-	2	1	4	4	1(3)
10517	Valerophenone, p-methoxy-*	4	3	4	1	1
18189	3, 5-Xylenol, 4-bromo-	4	1(4)	4	1	1

* Tested also in 1946.

** Stained nylon, rayon, or both.